



SEQUENCE LISTING

Rother, Russell P.
Faas-Knight, Susan
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Carr, Francis J.
Hamilton, Anita

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Pro Trp Ala Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Asn Phe
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Asn Ser Tyr Trp Met Gln Trp Val Lys Gln Arg Pro Gly Gln Gly Leu
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Glu Trp Ile Gly Ala Ile Tyr Pro Gly Asp Gly Asp Thr Ser Tyr Thr
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Gln Lys Phe Arg Gly Lys Ala Thr Leu Thr Ala Asp Lys Ser Ser Ser
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Thr Ala Tyr Met Gln Leu Ser Ser Leu Ala Ser Glu Asp Ser Ala Val
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Tyr Tyr Cys Ala Arg Arg Thr Val Gly Gly Tyr Phe Asp Tyr Trp Gly
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Gln Gly Thr Thr Leu Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser
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Val Phe Pro Leu Ala Pro Cys Ser Arg Ser Thr Ser Glu Ser Thr Ala
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Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val
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Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala
180 185 190

Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val
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Pro Ser Ser Asn Phe Gly Thr Gln Thr Tyr Thr Cys Asn Val Asp His
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<213> murine

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<400> 10

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Ser Val Lys Met Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Arg Tyr
          20          25          30

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Thr Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
          35          40          45

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Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Asn Gln Lys Phe
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Lys Asp Lys Ala Thr Leu Thr Thr Asp Lys Ser Ser Ser Thr Ala Tyr

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<400> 12

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Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Ala Thr Arg Tyr
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Thr Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Thr Thr Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Lys Thr Glu Asp Thr Ala Val Tyr Tyr Cys
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<210> 13

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<212> PRT

<213> artificial sequence

<220>

<223> de-immunized heavy chain variable region

<400> 13

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Thr Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Asn Gln Lys Phe
50 55 60

Lys Asp Arg Val Thr Ile Thr Thr Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Lys Thr Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Tyr Tyr Asp Asp His Tyr Cys Leu Asp Tyr Trp Gly Gln Gly
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Thr Thr Val Thr Val Ser Ser
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<213> artificial sequence

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<223> de-immunized heavy chain variable region

<400> 14

Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala
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Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Ala Thr Arg Tyr
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Thr Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Asn Gln Lys Val
50 55 60

Lys Asp Arg Phe Thr Ile Thr Thr Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Lys Thr Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Tyr Tyr Asp Asp His Tyr Cys Leu Asp Tyr Trp Gly Gln Gly
100 105 110

Thr Thr Val Thr Val Ser Ser
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<213> artificial sequence

<220>
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Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Arg Tyr
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Thr Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Asn Gln Lys Phe
50 55 60

Lys Asp Arg Val Thr Ile Thr Thr Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Lys Thr Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Tyr Tyr Asp Asp His Tyr Cys Leu Asp Tyr Trp Gly Gln Gly
100 105 110

Thr Thr Val Thr Val Ser Ser
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<210> 16
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<212> PRT
<213> artificial sequence

<220>
<223> de-immunized heavy chain variable region

<400> 16

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Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Arg Tyr
20 25 30

Thr Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Ala Gln Lys Phe
50 55 60

Gln Asp Arg Val Thr Ile Thr Thr Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Lys Thr Glu Asp Thr Ala Val Tyr Tyr Cys
Page 16

85

90

95

Ala Arg Tyr Tyr Asp Asp His Tyr Cys Leu Asp Tyr Trp Gly Gln Gly
 100 105 110

Thr Thr Val Thr Val Ser Ser
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<210> 17

<211> 119

<212> PRT

<213> artificial sequence

<220>

<223> de-immunized heavy chain variable region

<400> 17

Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala
 1 5 10 15

Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Arg Tyr
 20 25 30

Thr Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
 35 40 45

Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Asn Gln Lys Val
 50 55 60

Lys Asp Arg Phe Thr Ile Thr Thr Asp Lys Ser Ser Ser Thr Ala Tyr
 65 70 75 80

Leu Gln Met Asn Ser Leu Lys Thr Glu Asp Thr Ala Val Tyr Tyr Cys
 85 90 95

Ala Arg Tyr Tyr Asp Asp His Tyr Cys Leu Asp Tyr Trp Gly Gln Gly
 100 105 110

Thr Thr Val Thr Val Ser Ser
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<210> 18

<211> 106

<212> PRT

<213> murine

<400> 18

Gln Ile Val Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly
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Glu Lys Val Thr Met Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met
20 25 30

Asn Trp Tyr Gln Gln Lys Ser Gly Thr Ser Pro Lys Arg Trp Ile Tyr
35 40 45

Asp Thr Ser Lys Leu Ala Ser Gly Val Pro Ala His Phe Arg Gly Ser
50 55 60

Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Gly Met Glu Ala Glu
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Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Asn Pro Phe Thr
85 90 95

Phe Gly Ser Gly Thr Lys Leu Glu Ile Asn
100 105

<210> 19
<211> 106
<212> PRT
<213> artificial sequence

<220>
<223> de-immunized light chain variable region

<400> 19

Gln Ile Val Leu Thr Gln Ser Pro Ala Thr Leu Ser Leu Ser Pro Gly
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Glu Arg Ala Thr Leu Thr Cys Ser Ala Ser Ser Ser Ala Ser Tyr Met
20 25 30

Asn Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Arg Trp Ile Tyr
35 40 45

Asp Thr Ser Lys Leu Ala Ser Gly Val Pro Ser Arg Phe Ser Gly Ser
50 55 60

Gly Ser Gly Thr Asp Tyr Ser Leu Thr Ile Asn Ser Leu Glu Ala Glu
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Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Asn Pro Phe Thr
85 90 95

Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
100 105

<210> 20
<211> 106

<212> PRT
<213> artificial sequence

<220>
<223> de-immunized light chain variable region

<400> 20

Gln Ile Val Leu Thr Gln Ser Pro Ala Thr Leu Ser Leu Ser Pro Gly
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Glu Arg Ala Thr Leu Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met
20 25 30

Asn Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Arg Trp Ile Tyr
35 40 45

Asp Thr Ser Lys Leu Ala Ser Gly Val Pro Ser Arg Phe Ser Gly Ser
50 55 60

Gly Ser Gly Thr Asp Tyr Ser Leu Thr Ile Asn Ser Leu Glu Ala Glu
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85 90 95

Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
100 105

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<211> 819
<212> DNA
<213> artificial sequence

<220>
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 <212> PRT
 <213> artificial sequence

<220>
 <223> signal protein

<400> 22

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 <212> DNA
 <213> artificial sequence

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<210> 24
 <211> 15
 <212> PRT
 <213> artificial sequence

<220>
 <223> signal protein

<400> 24

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<210> 25

<211> 467

<212> PRT

<213> murine

<400> 25

Met Glu Arg His Trp Ile Phe Leu Leu Leu Leu Ser Val Thr Ala Gly
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Pro Gly Ala Ser Val Lys Met Ser Cys Lys Ala Ser Tyr Thr Phe Thr
35 40 45

Arg Tyr Thr Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu
50 55 60

Trp Ile Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Asn Gln
65 70 75 80

Lys Phe Lys Asp Lys Ala Thr Leu Thr Thr Asp Lys Ser Ser Ser Thr
85 90 95

Ala Tyr Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr
100 105 110

Tyr Cys Ala Arg Tyr Tyr Asp Asp His Tyr Cys Leu Asp Tyr Trp Gly
115 120 125

Gln Gly Thr Thr Leu Thr Val Ser Ser Ala Lys Thr Thr Ala Pro Ser
130 135 140

Val Tyr Pro Leu Ala Pro Val Cys Gly Asp Thr Thr Gly Ser Ser Val
145 150 155 160

Thr Leu Gly Cys Leu Val Lys Gly Tyr Phe Pro Glu Pro Val Thr Leu
165 170 175

Thr Trp Asn Ser Gly Ser Leu Ser Ser Gly Val His Thr Phe Pro Ala
180 185 190

Val Leu Gln Ser Asp Leu Tyr Thr Leu Ser Ser Ser Val Thr Val Thr
195 200 205

Ser Ser Thr Trp Pro Ser Gln Ser Ile Thr Cys Asn Val Ala His Pro
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 Ala Ser Ser Thr Lys Val Asp Lys Lys Ile Glu Pro Arg Gly Pro Thr
 225 230 235 240
 Ile Lys Pro Cys Pro Pro Cys Lys Cys Pro Ala Pro Asn Leu Leu Gly
 245 250 255
 Gly Pro Ser Val Phe Ile Phe Pro Pro Lys Ile Lys Asp Val Leu Met
 260 265 270
 Ile Ser Leu Ser Pro Ile Val Thr Cys Val Val Val Asp Val Ser Glu
 275 280 285
 Asp Asp Pro Asp Val Gln Ile Ser Trp Phe Val Asn Asn Val Glu Val
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 His Thr Ala Gln Thr Gln Thr His Arg Glu Asp Tyr Asn Ser Thr Leu
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 Glu Arg Thr Ile Ser Lys Pro Lys Gly Ser Val Arg Ala Pro Gln Val
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 Tyr Val Leu Pro Pro Pro Glu Glu Glu Met Thr Lys Lys Gln Val Thr
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Pro Gly Lys
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<210> 26
<211> 1570
<212> DNA
<213> murine

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gatcaaggat gtactcatga tctccctgag ccccatagtc acatgtgtgg tgggtggatgt 900
gagcgaggat gacccagatg tccagatcag ctggtttgtg aacaacgtgg aagtacacac 960
agctcagaca caaaccata gagaggatta caacagtact ctccgggtgg tcagtgcctt 1020
ccccatccag caccaggact ggatgagtgg caaggagttc aaatgcaagg tcaacaacaa 1080
agacctcca gcgcccacg agagaacccat ctcaaaaccc aaagggtcag taagagctcc 1140
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ctgcatggtc acagacttca tgctgaaga catttacgtg gagtggacca acaacgggaa 1260
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gtacagcaag ctgagagtgg aaaagaagaa ctgggtggaa agaaatagct actcctgttc 1380
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taaattgagct cagcaccac aaaactctca ggtccaaaga gacaccaca ctcatctcca 1500
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aaaggaattc 1570

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 <213> murine

<400> 27

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Val Ile Ile Ser Arg Gly Gln Ile Val Leu Thr Gln Ser Pro Ala Ile
 20 25 30

Met Ser Ala Ser Pro Gly Glu Lys Val Thr Met Thr Cys Ser Ala Ser
 35 40 45

Ser Ser Val Ser Tyr Met Asn Trp Tyr Gln Gln Lys Ser Gly Thr Ser
 50 55 60

Pro Lys Arg Trp Ile Tyr Asp Thr Ser Lys Leu Ala Ser Gly Val Pro
 65 70 75 80

Ala His Phe Arg Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile
 85 90 95

Ser Gly Met Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp
 100 105 110

Ser Ser Asn Pro Phe Thr Phe Gly Ser Gly Thr Lys Leu Glu Ile Asn
 115 120 125

Arg Ala Asp Thr Ala Pro Thr Val Ser Ile Phe Pro Pro Ser Ser Glu
 130 135 140

Gln Leu Thr Ser Gly Gly Ala Ser Val Val Cys Phe Leu Asn Asn Phe
 145 150 155 160

Tyr Pro Lys Asp Ile Asn Val Lys Trp Lys Ile Asp Gly Ser Glu Arg
 165 170 175

Gln Asn Gly Val Leu Asn Ser Trp Thr Asp Gln Asp Ser Lys Asp Ser
 180 185 190

Thr Tyr Ser Met Ser Ser Thr Leu Thr Leu Thr Lys Asp Glu Tyr Glu
 195 200 205

Arg His Asn Ser Tyr Thr Cys Glu Ala Thr His Lys Thr Ser Thr Ser
 210 215 220

Pro Ile Val Lys Ser Phe Asn Arg Asn Glu Cys
 225 230 235

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 catctccagg ggagaagggtc accatgacct gcagtgccag ctcaagtgtg agttacatga 180
 actggtacca gcagaagtca ggcacctccc ccaaaagatg gatttatgac acatccaaac 240
 tggcttcttg agtccctgct cacttcaggg gcagtgggtc tgggacctct tactctctca 300
 caatcagcgg catggagggt gaagatgctg ccacttatta ctgccagcag tggagtagta 360
 acccattcac gttcggctcg gggacaaaagt tggaaataaa ccgggctgat actgcaccaa 420
 ctgtatccat cttcccacca tcagtgagc agttaacatc tggagggtgcc tcagtcgtgt 480
 gcttcttgaa caacttctac cccaaagaca tcaatgtcaa gtggaagatt gatggcagtg 540
 aacgacaaaa tggcgtcctg aacagttgga ctgatcagga cagcaaagac agcacctaca 600
 gcatgagcag caccctcacg ttgaccaagg acgagtatga acgacataac agctatacct 660
 gtgaggccac tcacaagaca tcaacttcac ccattgtcaa gagcttcaac aggaatgagt 720
 gttagagaca aagggtcctga gacgccacca ccagctccca gctccatcct atcttcctt 780
 ctaaggctctt ggaggcttcc ccacaagcgc ttaccactgt tgcggtgctc taaacctcct 840
 cccacctcct tctcctcctc ctcccttcc ttggctttta tcatgctaatt atttgcagaa 900
 aatattcaat aaagtgagtc tttgccttga aaaaaaaaaa aaa 943

<210> 29
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 <213> murine

<400> 29

Gly Val His Ser Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Ala
 1 5 10 15

Arg Pro Gly Ala Ser Val Lys Met Ser Cys Lys Ala Ser Gly Tyr Thr
 20 25 30

Phe Thr Arg Tyr Thr Met His Trp Val Lys Gln Arg Pro Gly Gln Gly
 35 40 45

Leu Glu Trp Ile Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr
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Asn Gln Lys Phe Lys Asp Lys Ala Thr Leu Thr Thr Asp Lys Ser Ser
65 70 75 80

Ser Thr Ala Tyr Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala
85 90 95

Val Tyr Tyr Cys Ala Arg Tyr Tyr Asp Asp His Tyr Cys Leu Asp Tyr
100 105 110

Trp Gly Gln Gly Thr Thr Leu Thr Val Ser Ser
115 120

<210> 30
<211> 110
<212> PRT
<213> murine

<400> 30

Gly Val His Ser Gln Ile Val Leu Thr Gln Ser Pro Ala Ile Met Ser
1 5 10 15

Ala Ser Pro Gly Glu Lys Val Thr Met Thr Cys Ser Ala Ser Ser Ser
20 25 30

Val Ser Tyr Met Asn Trp Tyr Gln Gln Lys Ser Gly Thr Ser Pro Lys
35 40 45

Arg Trp Ile Tyr Asp Thr Ser Lys Leu Ala Ser Gly Val Pro Ala His
50 55 60

Phe Arg Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Gly
65 70 75 80

Met Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser
85 90 95

Asn Pro Phe Thr Phe Gly Ser Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 31
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<212> PRT
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<400> 31

Glu Ser Lys Tyr Gly Pro Pro Cys Pro Ser Cys Pro
1 5 10

<210> 32
<211> 110
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<400> 32

Ala Pro Glu Phe Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys
1 5 10 15

Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val
20 25 30

Val Val Asp Val Ser Gln Glu Asp Pro Glu Val Gln Phe Asn Trp Tyr
35 40 45

Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu
50 55 60

Gln Phe Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His
65 70 75 80

Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys
85 90 95

Gly Leu Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys Ala Lys
100 105 110

<210> 33
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<212> PRT
<213> human

<400> 33

Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu
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Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe
20 25 30

Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu
35 40 45

Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe
50 55 60

Phe Leu Tyr Ser Arg Leu Thr Val Asp Lys Ser Arg Trp Gln Glu Gly
65 70 75 80

Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr
Page 27

85

90

95

Thr Gln Lys Ser Leu Ser Leu Ser Leu Gly Lys
 100 105

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 <211> 12
 <212> PRT
 <213> human

<400> 34

Glu Arg Lys Cys Cys Val Glu Cys Pro Pro Cys Pro
 1 5 10

<210> 35
 <211> 109
 <212> PRT
 <213> human

<400> 35

Ala Pro Pro Val Ala Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro
 1 5 10 15

Lys Asp Thr Leu Asn Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val
 20 25 30

Val Asp Val Ser Gln Glu Asp Pro Glu Val Gln Phe Asn Trp Tyr Val
 35 40 45

Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln
 50 55 60

Phe Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln
 65 70 75 80

Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Gly
 85 90 95

Leu Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys Ala Lys
 100 105

<210> 36
 <211> 107
 <212> PRT
 <213> human

<400> 36

Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu
 1 5 10 15

Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe
20 25 30

Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu
35 40 45

Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe
50 55 60

Phe Leu Tyr Ser Arg Leu Thr Val Asp Lys Ser Arg Trp Gln Glu Gly
65 70 75 80

Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr
85 90 95

Thr Gln Lys Ser Leu Ser Leu Ser Leu Gly Lys
100 105

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<400> 37
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<210> 38
<211> 47
<212> DNA
<213> artificial sequence

<220>
<223> oligonucleotide

<400> 38
gccccagggtt tcttgacttc agccccagac tgtaccagct ggacctg 47

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<213> artificial sequence

<220>
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<400> 39
tgggtaagac aggcgcctgg acaaggtttg g 31

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<220>
 <223> oligonucleotide
 <400> 40
 gtccaggcgc ctgtcttacc cagtgcac 29

<210> 41
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 <212> DNA
 <213> artificial sequence

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 aggcgcctgt cttacccagt gcatcgtgta cctagtagcc gtgtagcc 48

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 caatcagaag ttcaaggaca gggtcacaat cactacagac aaa 43

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 cgctcagaag ttccaggaca gggtcacaat cactacagac aaa 43

<210> 44
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 cgctgacagt gtcaagggca gggtcacaat cactacagac aaa 43

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<210> 47 <211> 37 <212> DNA <213> artificial sequence	
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<210> 50 <211> 35 <212> DNA <213> artificial sequence	
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<400> 52
ccaaggcacc actgtgacag tctcctcagg

30

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<220>
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cctgaggaga ctgtcacagt ggtgccttgg

30

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ggtgtccact cccagggtcca gctg

24

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cagctggacc tgggagtgga cacctgtgg

29

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<220>
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<400> 63
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<210> 64
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 ttcacgttcg gacaaggtac aaaggtggaa atcaaacg 38

<210> 66
 <211> 38
 <212> DNA
 <213> artificial sequence

<220>
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<400> 66
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<400> 67
gcggatccag tcgacgaagc a 21

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<220>
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ctgaatggat ccaactgagg aagcaaagtt taaattctac tcacg 45

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<220>
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<400> 69
caaattgttc tcaccagtc tccagcaa 28

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ttgctggaga ctgggtgaga acaatttggg ag 32

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tggagactgg gtgagaacaa tttgggagtg gacacctgtg g 41

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 agagaggggtt gctggagact gggtagaac aatttg 36

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 <400> 73
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<210> 74
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 <400> 74
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<210> 75
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 <400> 75

Val Ser Thr Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys
 1 5 10 15

Pro Gly Ala Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Ala
 20 25 30

Thr Arg Tyr Thr Met His Trp Tyr Arg Gln Ala Pro Gly Gln Gly Leu
 35 40 45

Glu Trp Ile Gly Tyr Ile Asn Pro Ser Arg Gly Tyr Thr Asn Tyr Ala
 50 55 60

Gln Lys Phe Gln Gln Arg Val Thr Ile Thr Thr Asp Lys Ser Ser Ser
 65 70 75 80

Thr Ala Tyr Leu Gln Met Asn Ser Leu Lys Thr Glu Asp Thr Ala Val
 85 90 95

Tyr Tyr Cys Ala Arg Tyr Tyr Asp Asp His Tyr Cys Leu Asp Tyr Trp
100 105 110

Gly Gln Gly Thr Thr Val Thr Val Ser Gly
115 120

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<400> 76

Gly Val His Ser Gln Ile Val Leu Thr Gln Ser Pro Ala Thr Leu Ser
1 5 10 15

Leu Ser Pro Gly Glu Arg Ala Thr Leu Thr Cys Ser Ala Ser Ser Ser
20 25 30

Ala Ser Tyr Met Asn Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys
35 40 45

Arg Trp Ile Tyr Asp Thr Ser Lys Leu Ala Ser Gly Val Pro Ser Arg
50 55 60

Phe Ser Gly Ser Gly Ser Gly Thr Asp Tyr Ser Leu Thr Ile Asn Ser
65 70 75 80

Leu Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser
85 90 95

Asn Pro Phe Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
100 105 110

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<220>
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<400> 77

ttgtgagcgg ataacaattt c

21

<210> 78
<211> 23
<212> DNA
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<220>
 <223> primer
 <400> 78
 gttttcccag tcacgacggtt gta 23

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<220>
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 <400> 79
 cttgcagcct ccaccaaggg cccatccgtc 30

<210> 80
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 <212> DNA
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<220>
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 <400> 80
 cccttggtgg aggctgcaag agagg 25

<210> 81
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 <212> DNA
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<220>
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 gagcctctcc ctgtctctgg gtaaagtgt gcc 33

<210> 82
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<220>
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<210> 83
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 <212> DNA
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<220>
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<400> 83
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35